National Renewable Energy Laboratory
Innovation for Our Energy Future

Clean Energy Development in the Southeast

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DOE/NREL Analysis Seminar Series

National Renewable Energy Laboratory

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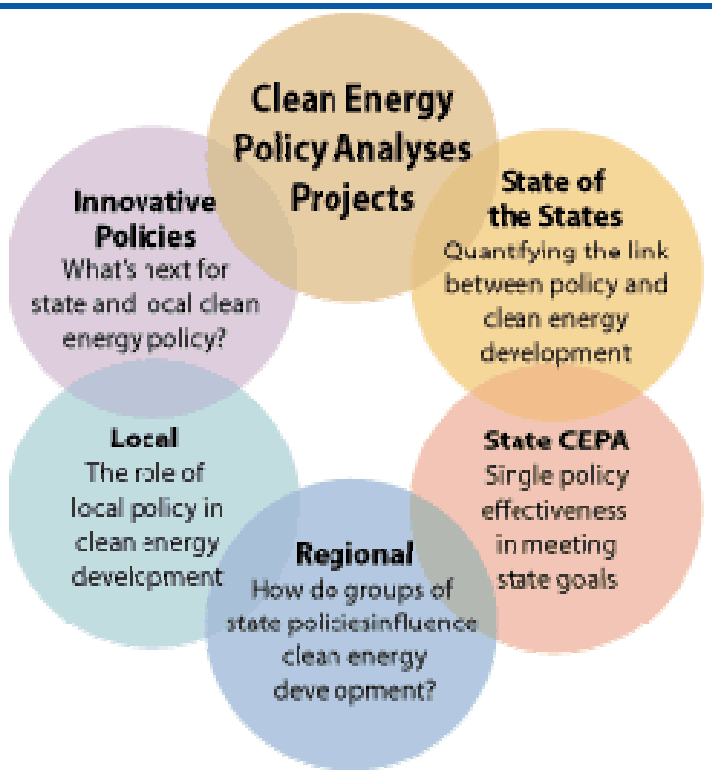
Clean Energy Policy Analyses (CEPA)

Funded by DOE's
Office of Weatherization and Intergovernmental Programs

National-Regional-State-Local

CEPA reports discuss…

- policy implementation updates
- policy options and design features
- policy interactions
- quantifying policy impacts
- policy drivers



Recent Reports

States Clean Energy Data Book, October 2010

Status and Impact of CE Policy at Local Level, December 2010

State of the States, January 2011

**Southeast Regional CE Policy Analysis, January 2011*

Southeast Regional Clean Energy Development

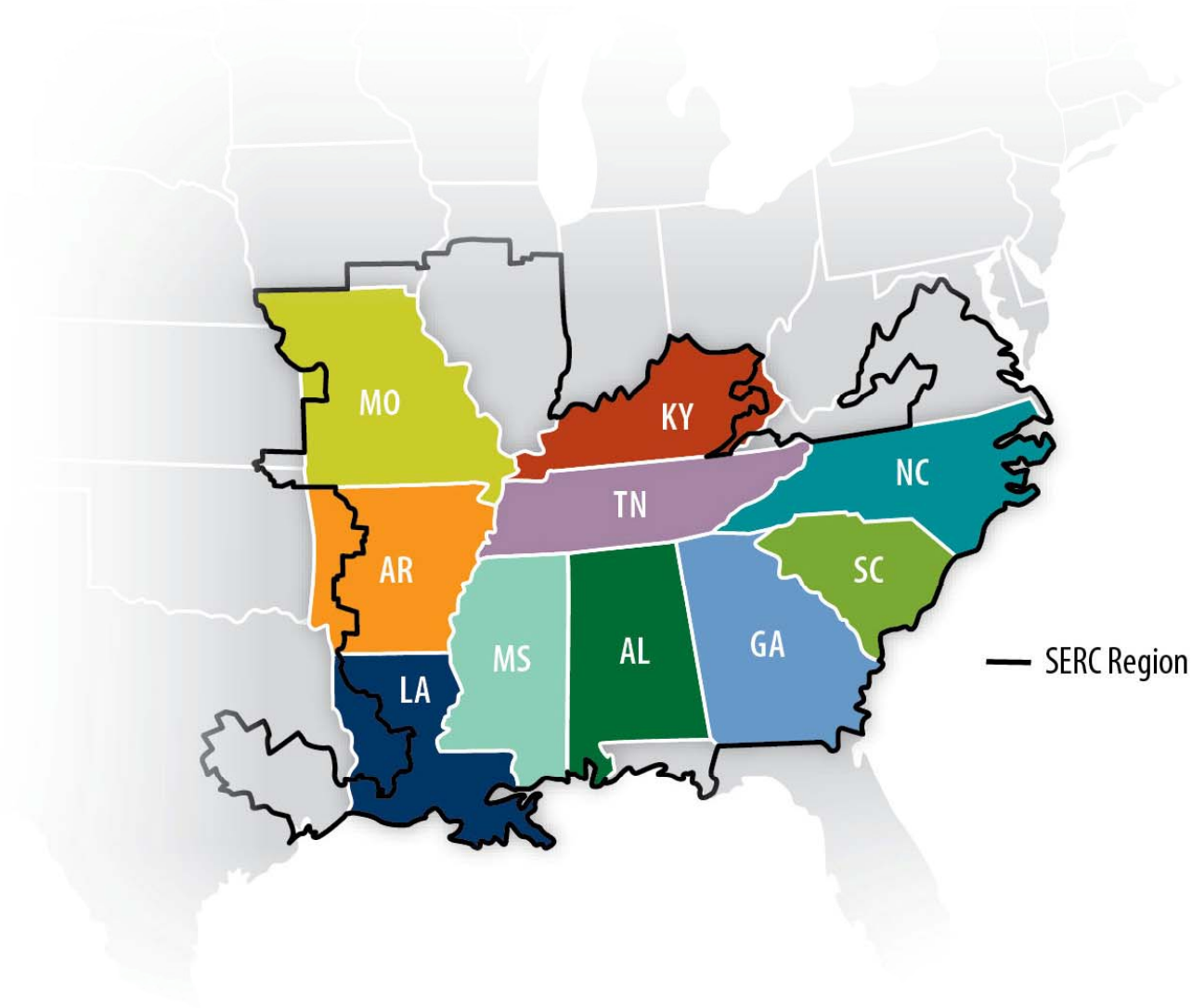
Background

RE in the SE

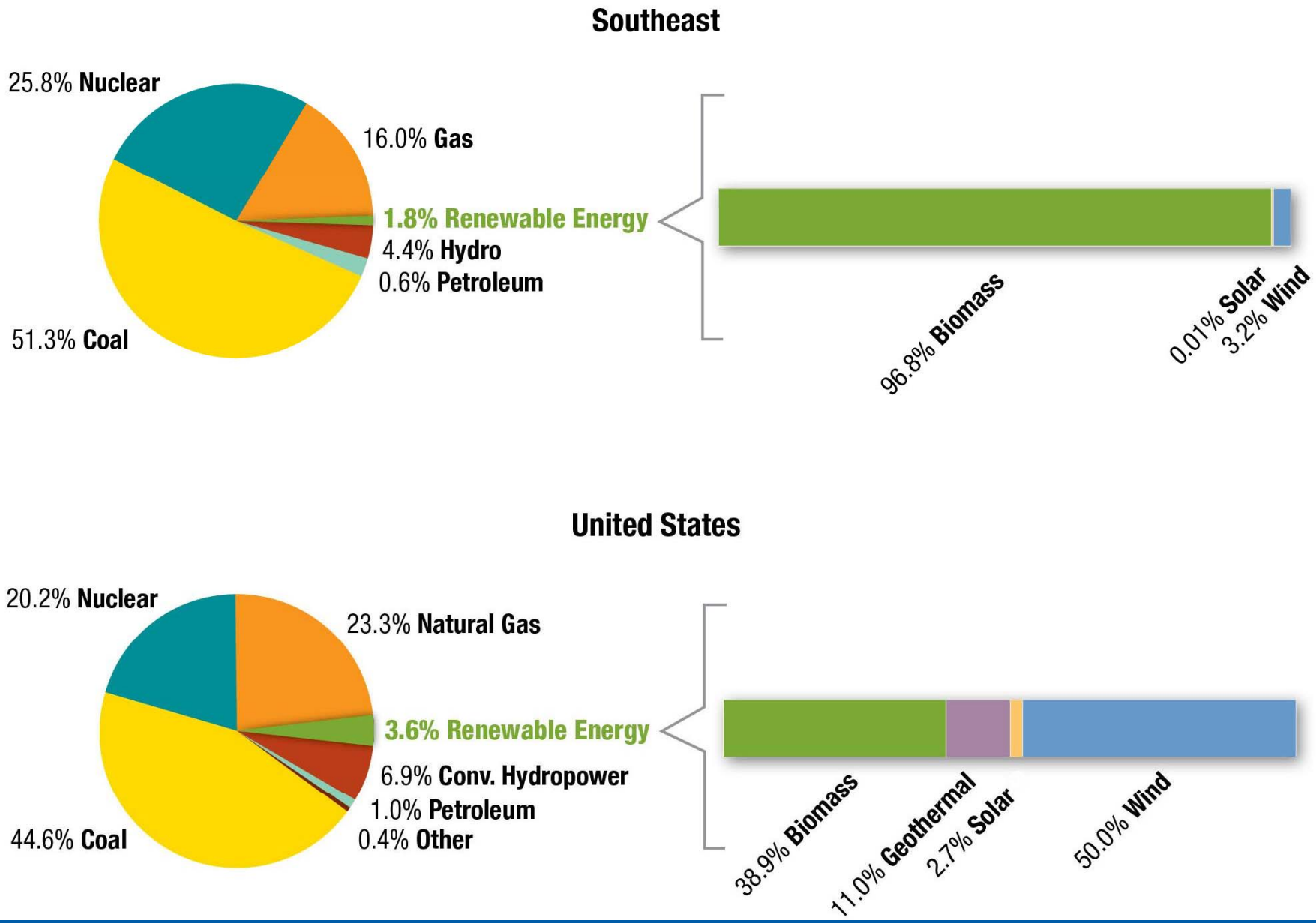
Policy & Opportunities

Conclusions

Modified SERC Region



Fuel Mix - Southeast vs. US



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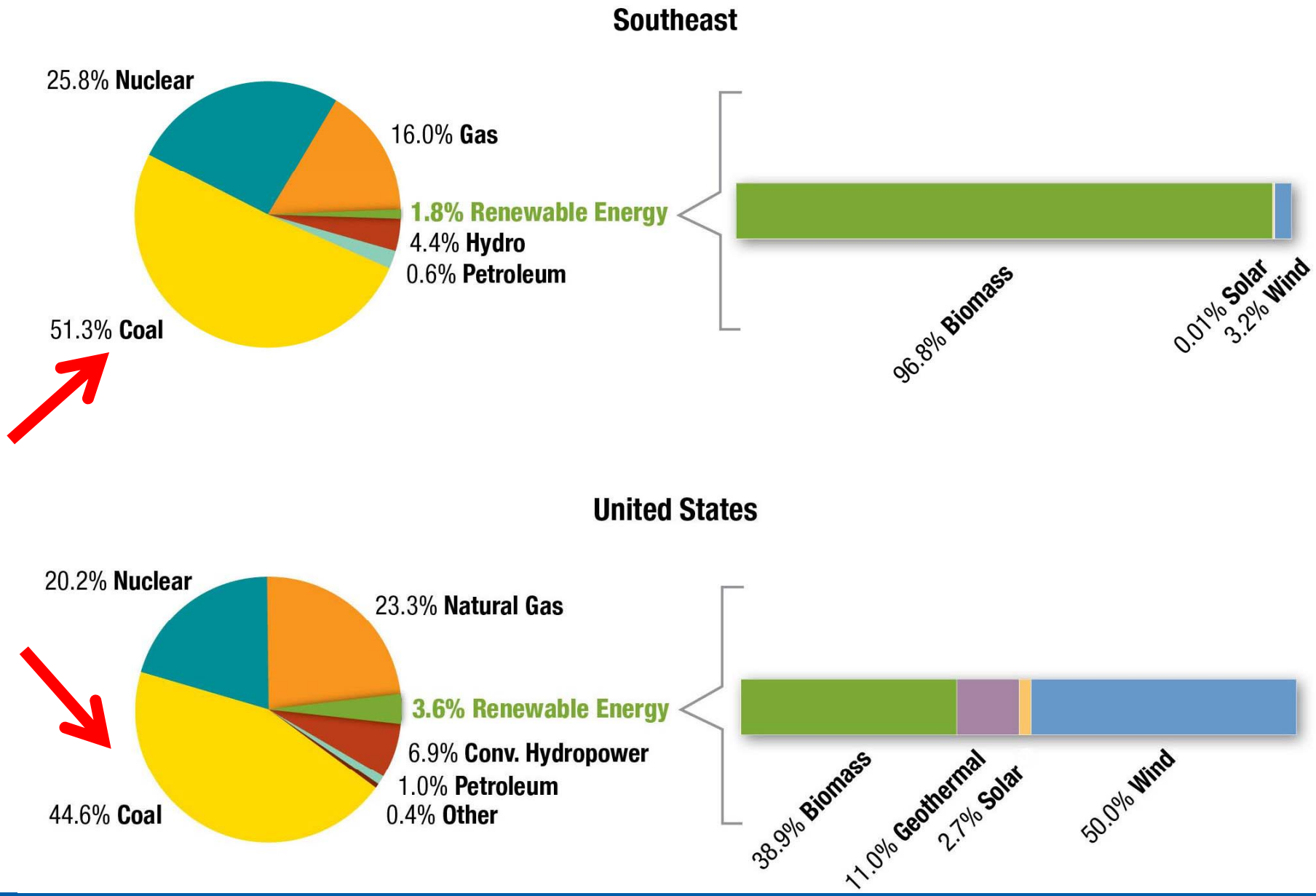

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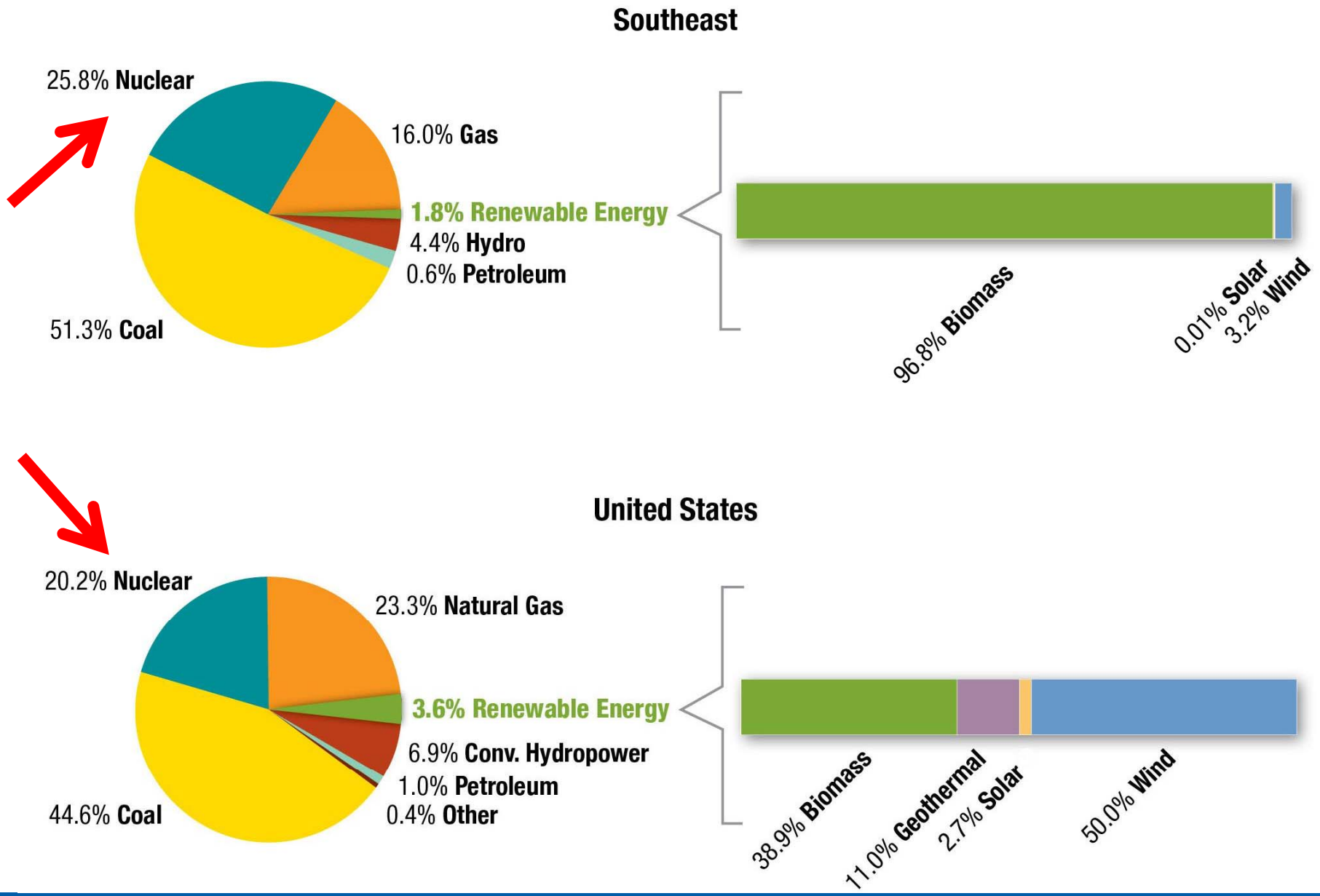

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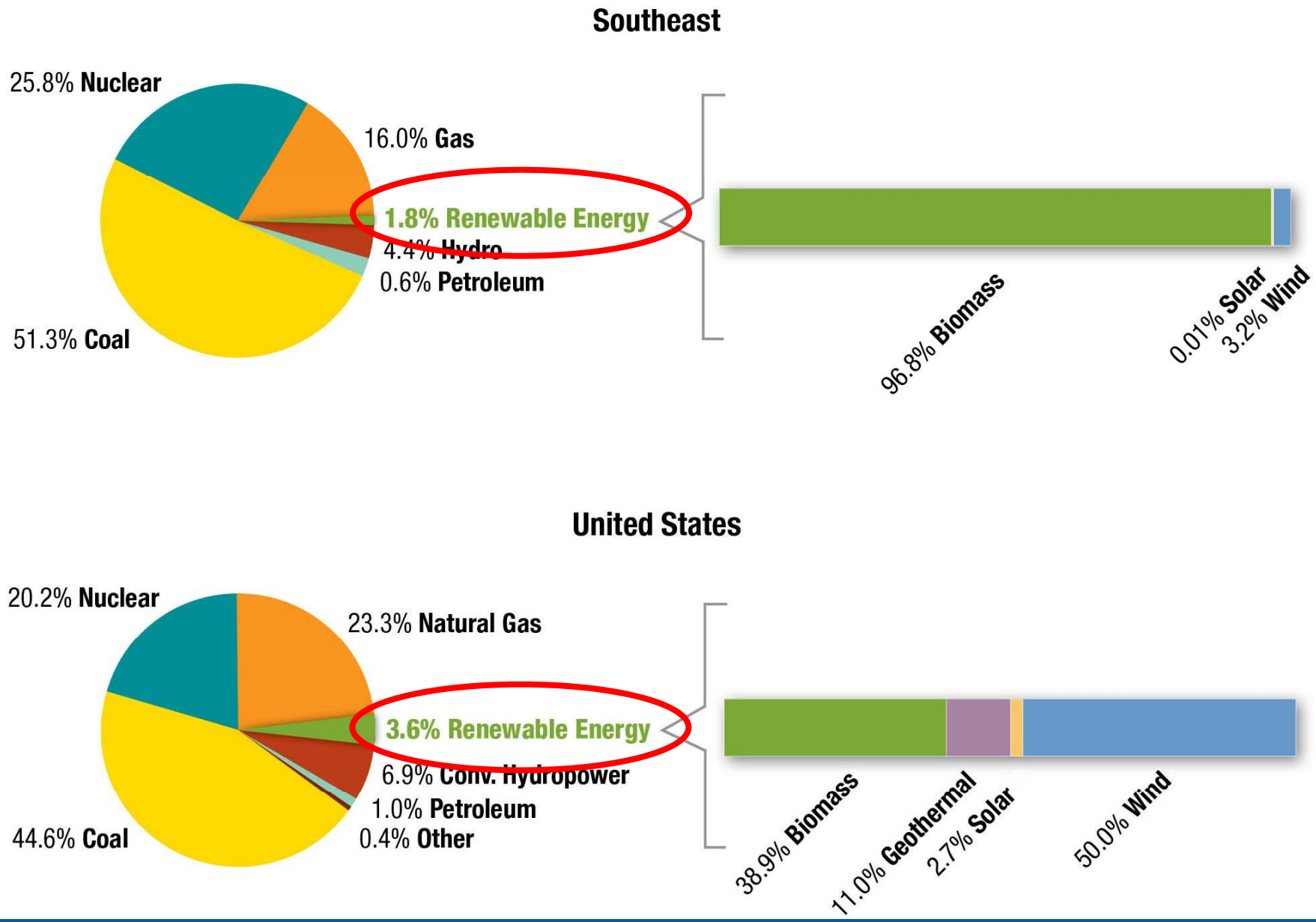
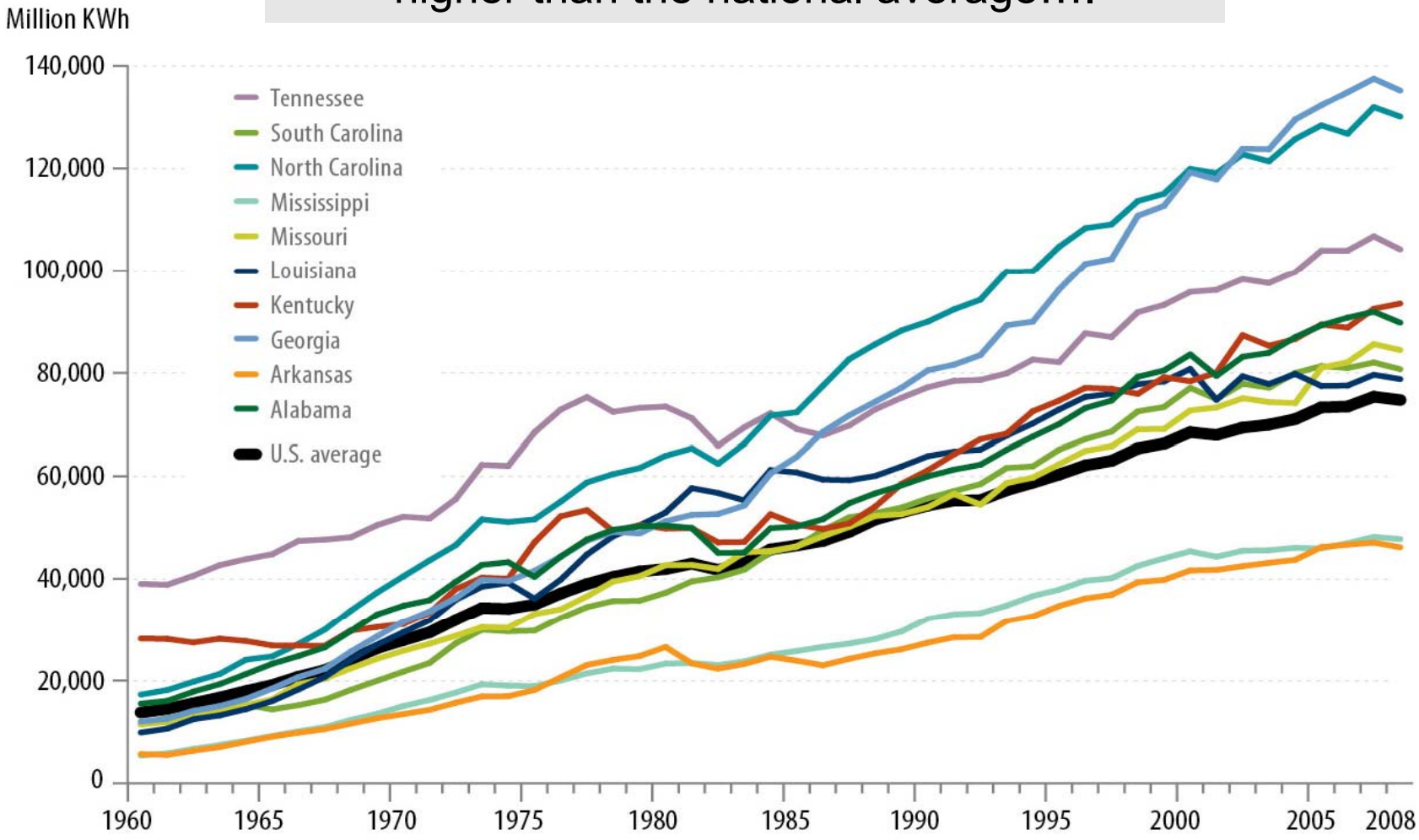


Energy Consumption in the SE

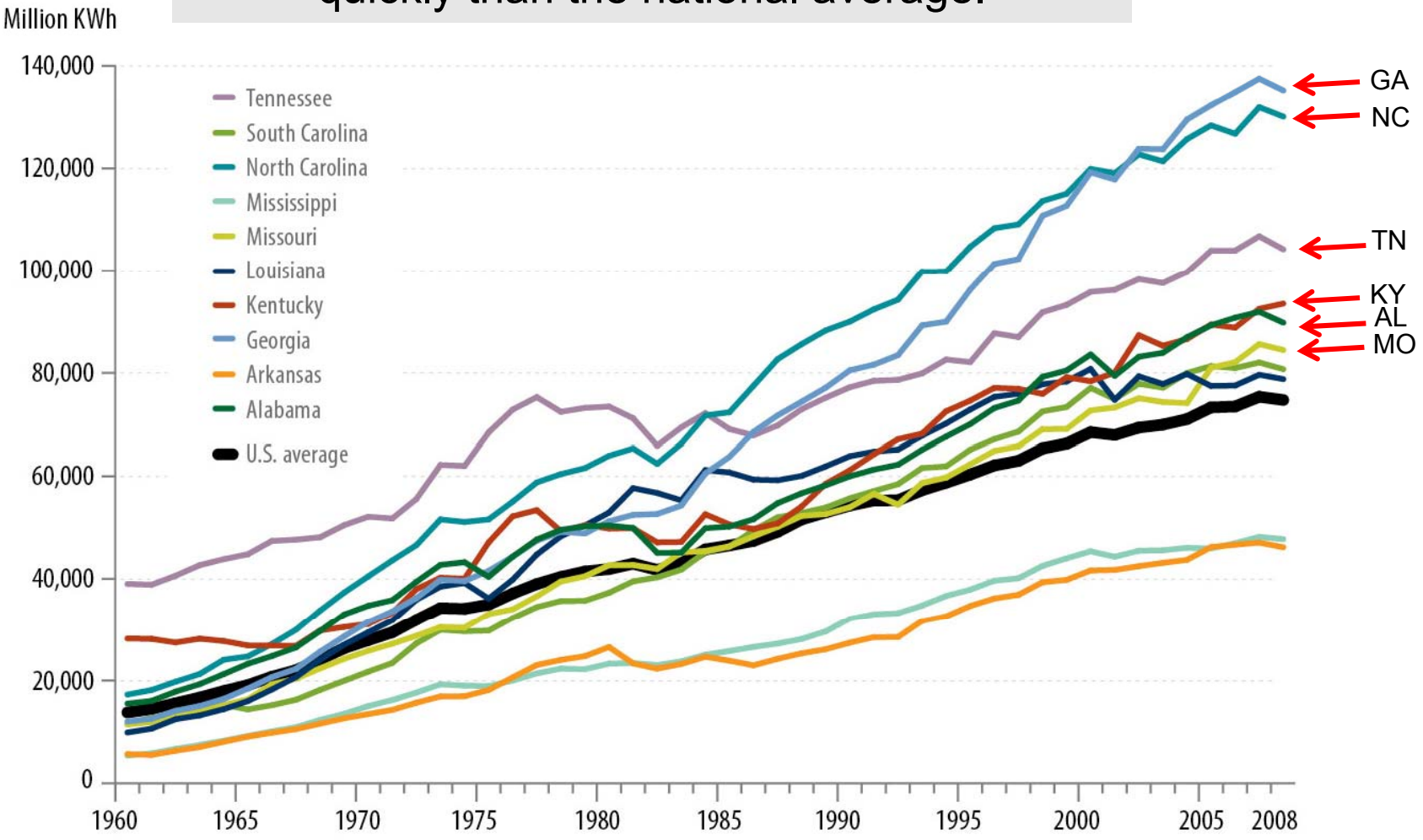
In most Southeastern states, consumption is higher than the national average….



Source: EIA, State Energy Data System, http://www.eia.doe.gov/states/_seds.html

Energy Consumption in the SE

…and consumption is generally growing more quickly than the national average.



Source: EIA, State Energy Data System, http://www.eia.doe.gov/states/_seds.html

Need for Additional Capacity in the Region

There is a need for new capacity in the region.

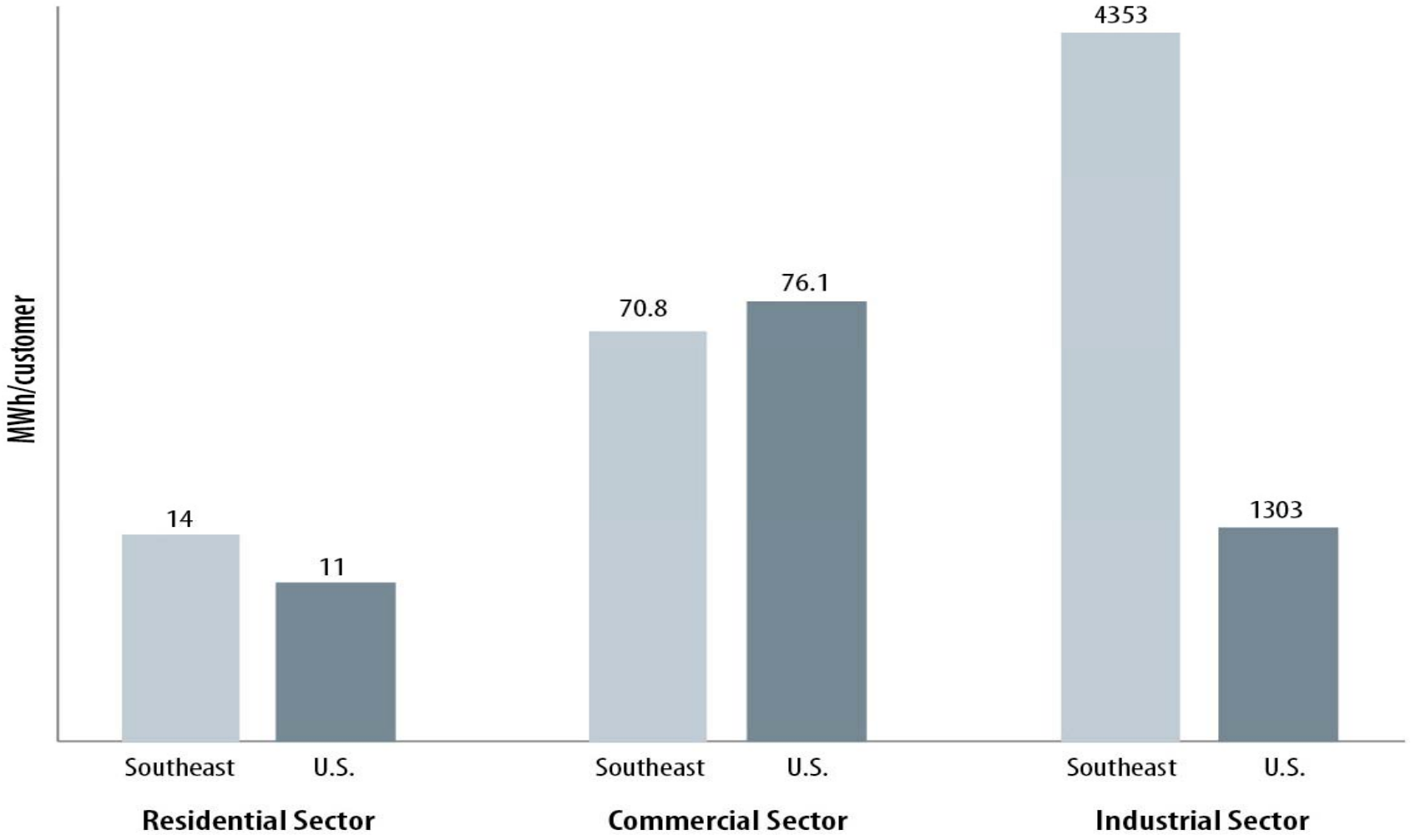
Demand is rising

- High population growth rate
- 20% increase in capacity needed by 2030

Existing capacity is falling

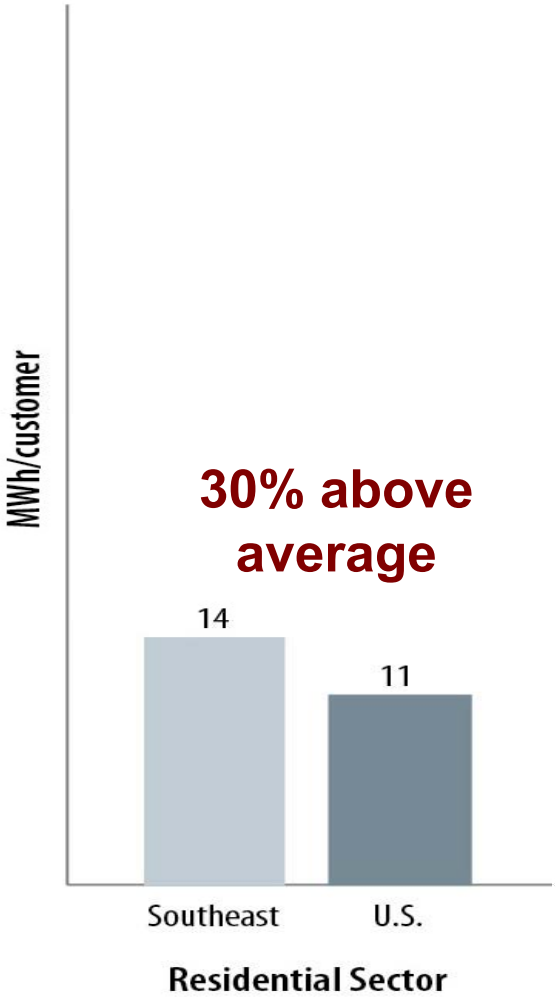
- 50,000+ MW of coal-fired generation built 1950s & 1960s
- Aging plants likely to be retired in next 20-30 years

Energy Use by Sector



Source: Energy Information Administration (2010). Table 5. Average Monthly Bill by Census Division and State for 2008. http://www.eia.doe.gov/cneaf/electricity/esr/table5.html

Energy Use by Sector



Factors influencing high **residential** use

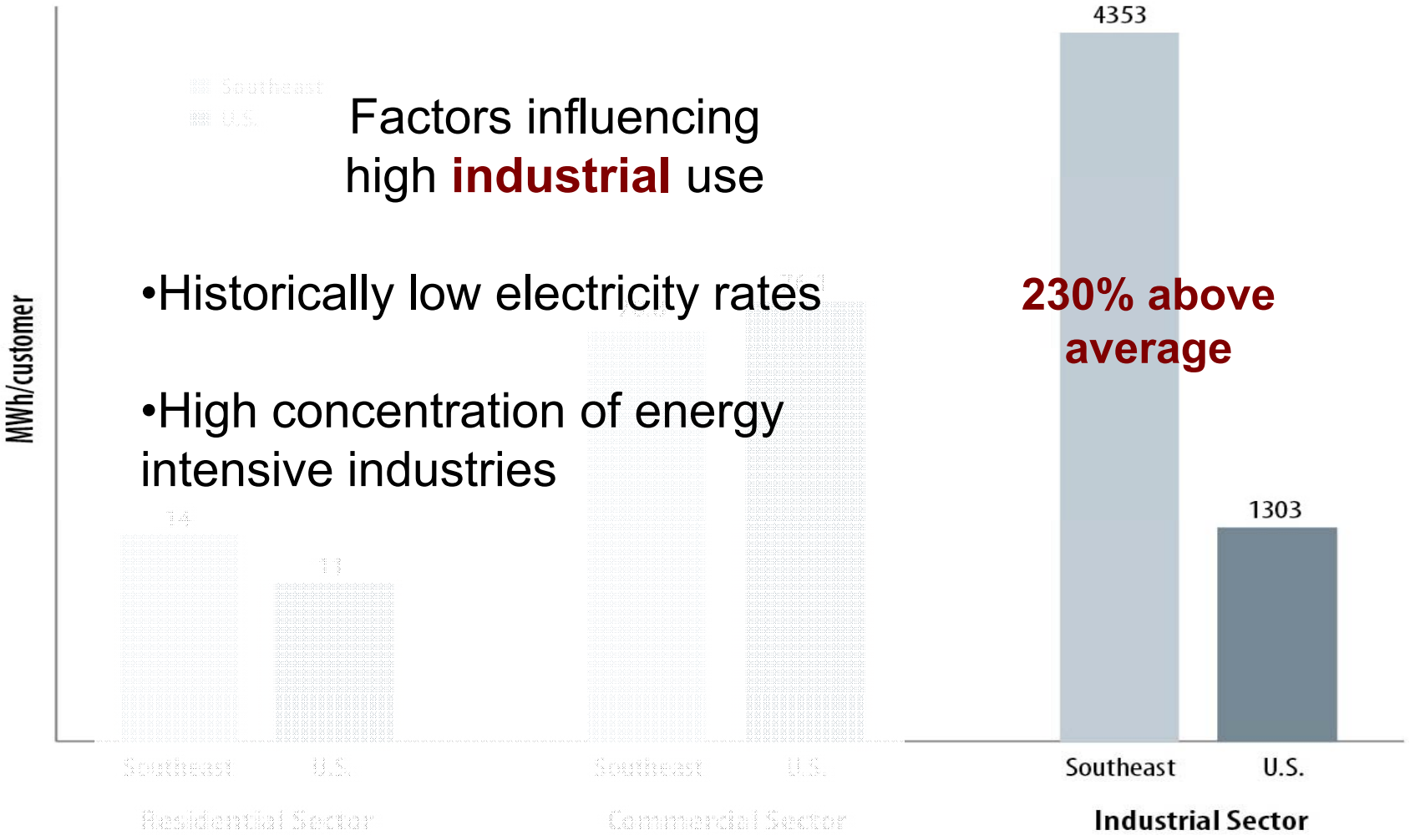
- Climate requires heating & cooling
- Limited public expenditures on EE

Source: Energy Information Administration (2010). Table 5. Average Monthly Bill by Census Division and State for 2008. http://www.eia.doe.gov/cneaf/electricity/esr/table5.html

Energy Use by Sector

Factors influencing high **industrial** use

- Historically low electricity rates
- High concentration of energy intensive industries



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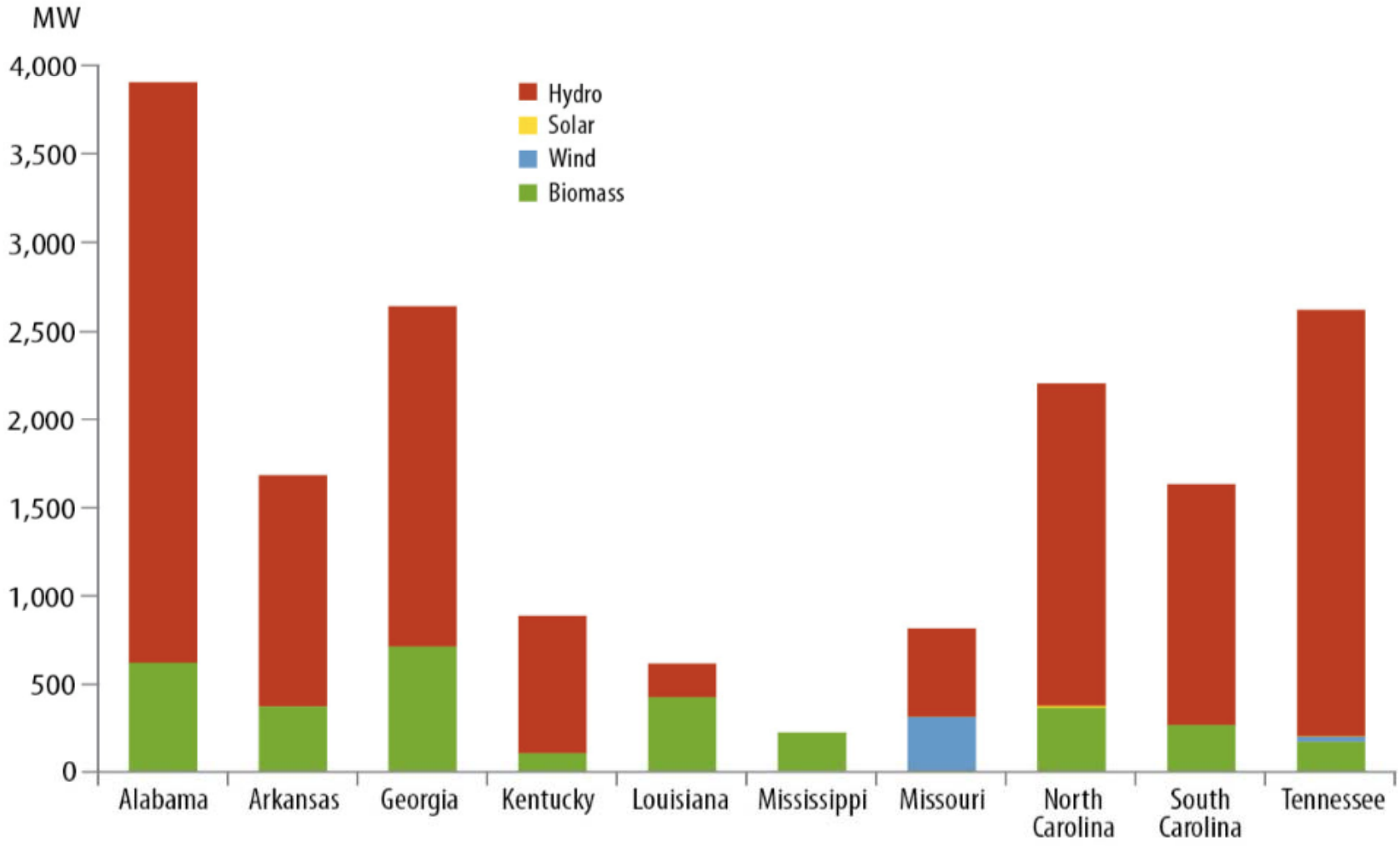
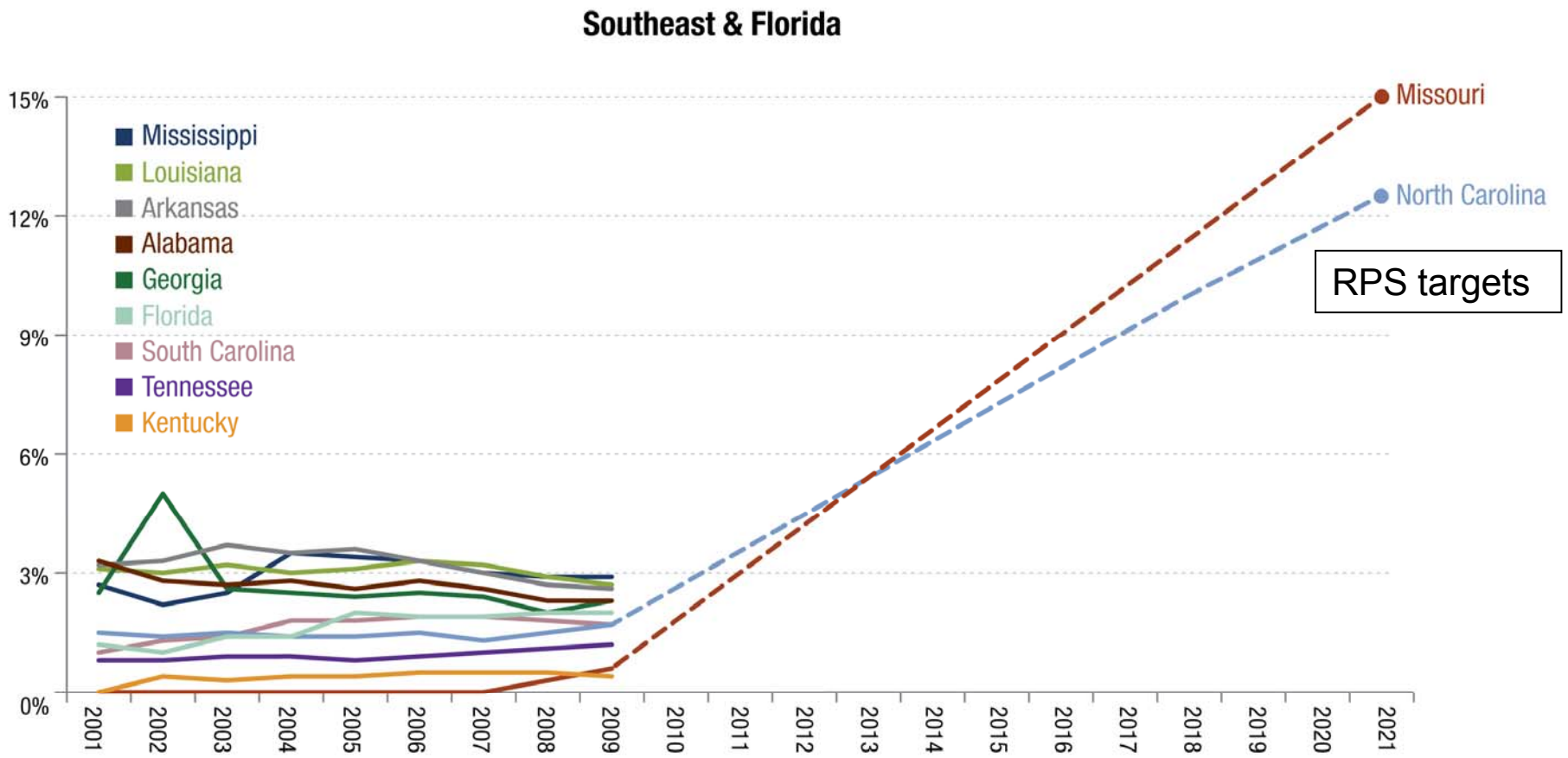
Renewable Energy Capacity by State (2009)

Most renewable capacity in the SE is traditional hydro and biomass.



Renewable Energy Generation

The percentage of RE generation has not increased significantly.



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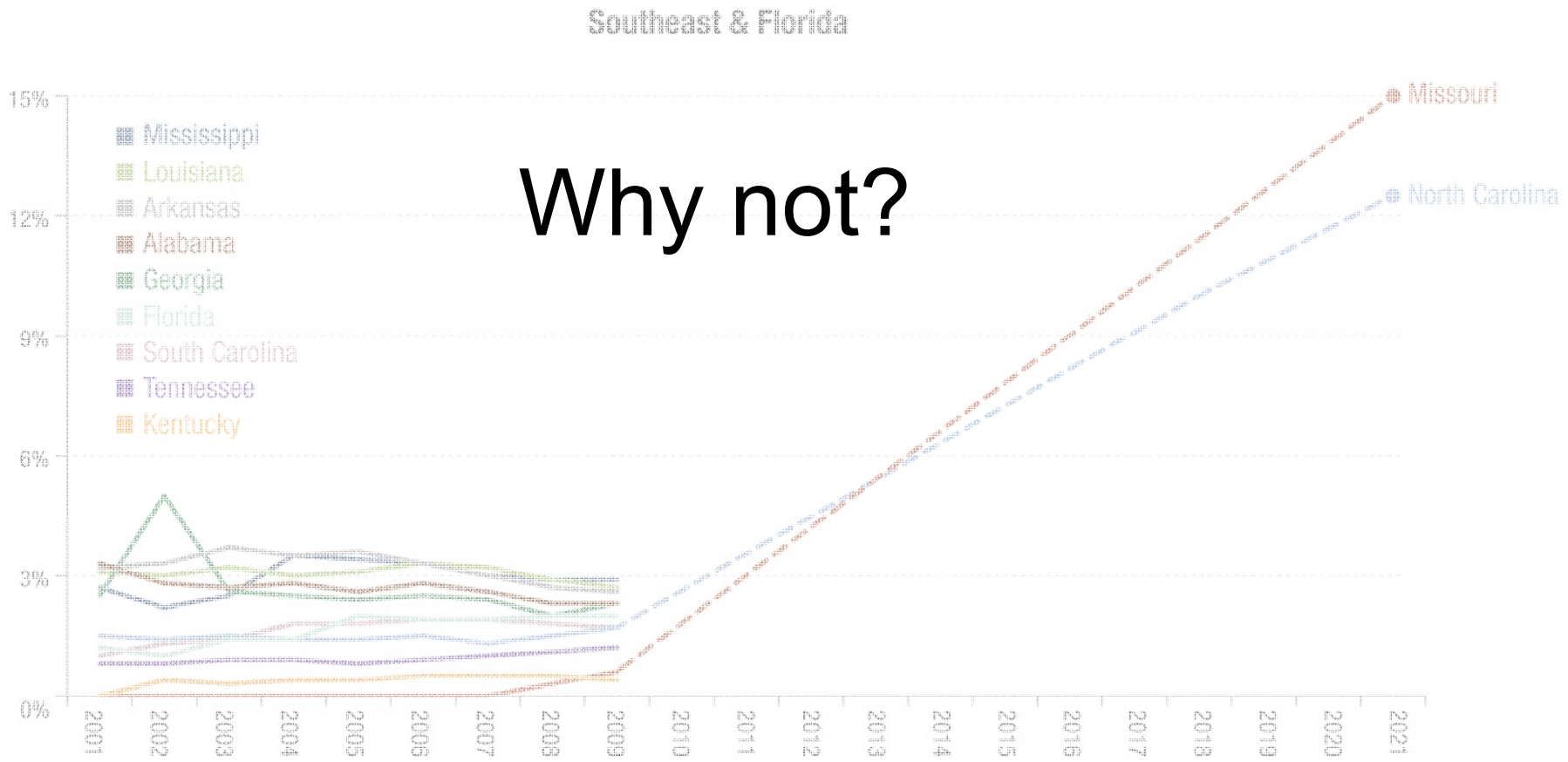


Why not?

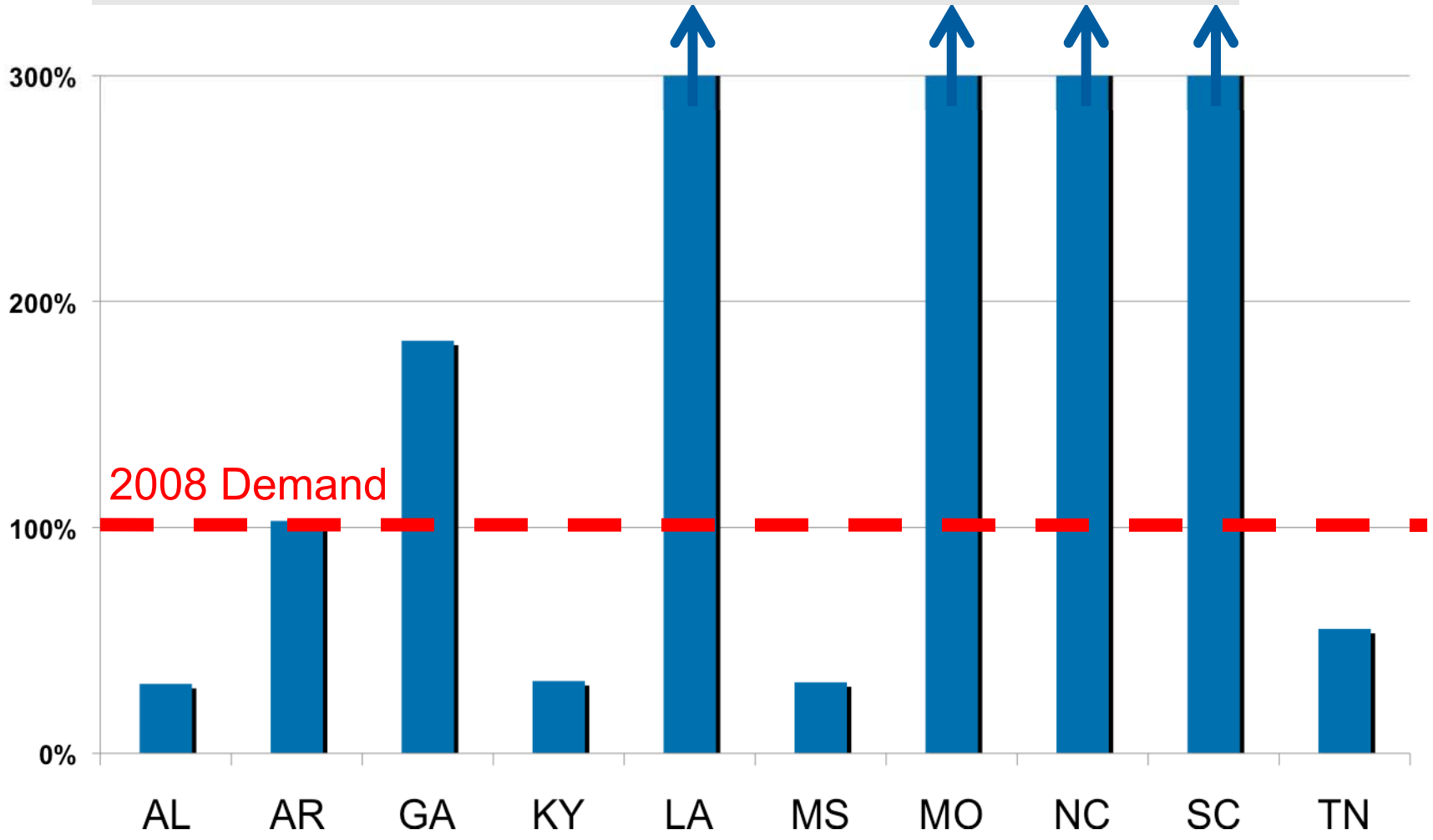
Coal Use & Imports in the SE (2008)

Much of the coal used to generate electricity is imported.

	% Electricity from Coal	% Coal Imported (Net)
AL	**51%**	**79%**
AR	47%	**100%**
GA	**63%**	**100%**
KY	**94%**	38%
LA	26%	**75%**
MS	35%	**70%**
MO	**81%**	**99%**
NC	**61%**	**100%**
SC	41%	**100%**
TN	**62%**	**99%**

Renewable Energy Potential

RE potential exceeds current demand in many states.



Potentials based on NREL potential data and EIA consumption data and represent current technically feasible potential, accounting for environmental and land-use restrictions.

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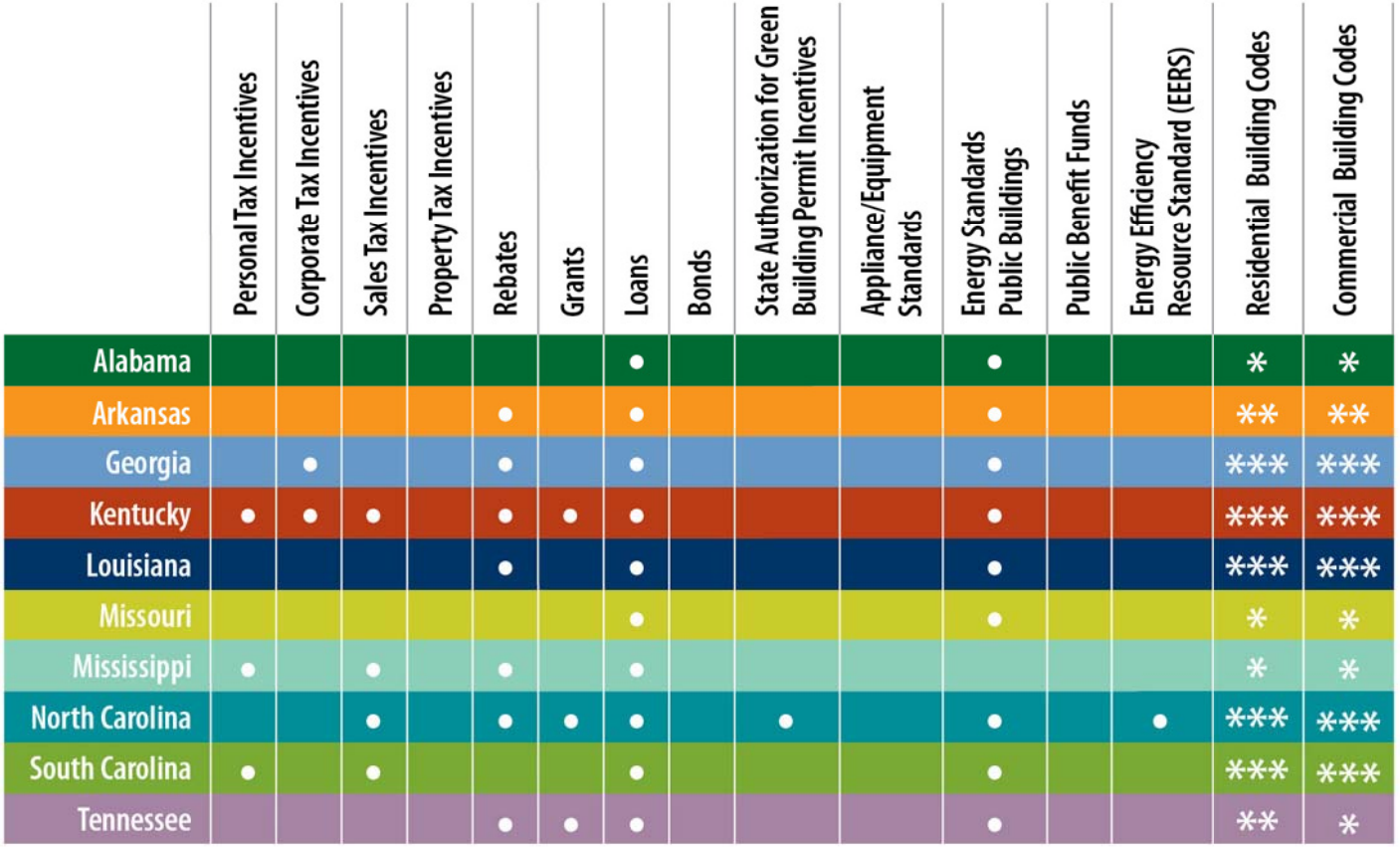
Current Energy Efficiency Policies



	Personal Tax Incentives	Corporate Tax Incentives	Sales Tax Incentives	Property Tax Incentives	Rebates	Grants	Loans	Bonds	State Authorization for Green Building Permit Incentives	Appliance/Equipment Standards	Energy Standards Public Buildings	Public Benefit Funds	Energy Efficiency Resource Standard (EERS)	Residential Building Codes	Commercial Building Codes
Alabama							●				●			*	*
Arkansas					●		●				●			**	**
Georgia		●			●		●				●			***	***
Kentucky	●	●	●		●	●	●				●			***	***
Louisiana					●		●				●			***	***
Missouri							●				●			*	*
Mississippi	●		●		●		●							*	*
North Carolina			●		●	●	●		●		●		●	***	***
South Carolina	●		●				●				●			***	***
Tennessee					●	●	●				●			**	*

* – no statewide code, or code precedes 1998 IECC

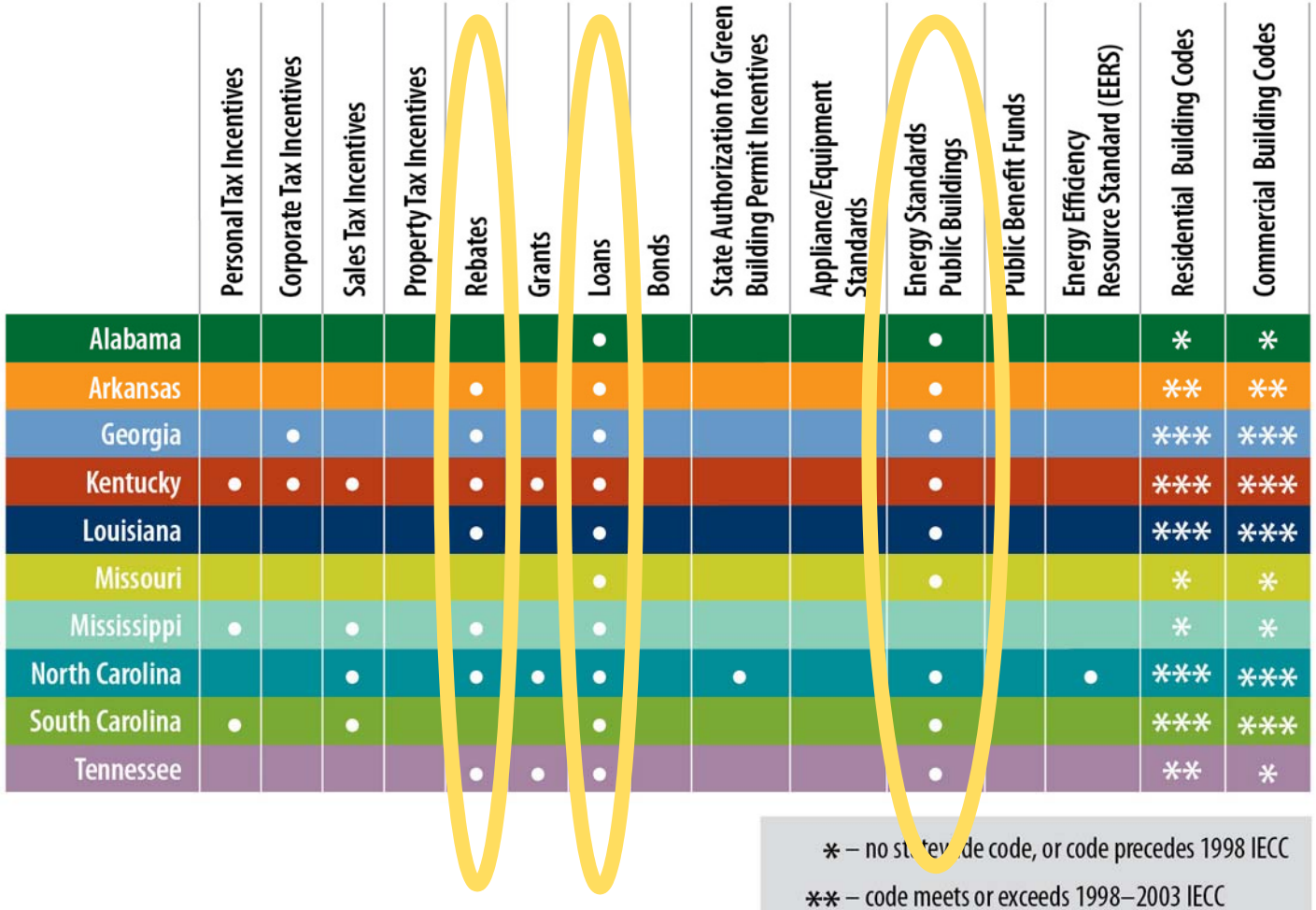
** – code meets or exceeds 1998–2003 IECC

*** – code meets or exceeds 2006 IECC

Note: State incentives only. Does not include utility, local, or non-profit incentives. Updated from sources as of October 1, 2010.

Sources: DSIRE, http://www.dsireusa.org/summarytables/index.cfm?ee=1&RE=1
Building Codes Assistance Project: Online Code Environment & Advocacy Network, http://bcap-ocean.org/
OCEAN, http://bcap-ocean.org/code-status-map-commercial
ACEEE, http://www.aceee.org/energy/state/State_EERS_Summary_Apr_2010.pdf

Current Energy Efficiency Policies



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OCEAN, http://bcap-ocean.org/code-status-map-commercial
ACEEE, http://www.aceee.org/energy/state/State_EERS_Summary_Apr_2010.pdf

Energy Efficiency Policy Opportunities

Address “split incentives” in building sector

Remove disincentives for utilities to invest in RE

Increase efficiency of water use and heating

Energy Efficiency Policy Opportunities

Address “split incentives” in building sector

Energy Efficiency Policy Opportunities

Address “split incentives” in building sector

Update Building Codes

Meets Current Standard	Meets an Older Standard	No Code
Georgia	Arkansas	Alabama
Kentucky	Tennessee (Residential)	Mississippi
Louisiana		Missouri
North Carolina		Tennessee (Commercial)
South Carolina		

Current Standard:
Residential = IECC 2006
Commercial = ASHRAE 90.1 2004

Energy Efficiency Policy Opportunities

Remove disincentives for utilities to invest in efficiency

Energy Efficiency Policy Opportunities

Remove disincentives for utilities to invest in efficiency

- Value efficiency as an energy resource in the Integrated Resource Planning (IRP) process
- Decouple utility sales (kW) from revenues ($)
- Incentivize utility-led residential efficiency programs

Energy Efficiency Policy Opportunities

Current utility expenditures on efficiency are minimal.

	Expenditures on Net Coal Imports (per capita)	Expenditures on Energy Efficiency Programs (per capita)
AL	$297	$0.49
AR	$162	$0.55
GA	$270	$0.50
KY	($1170)	$0.40
LA	$110	$0.00
MS	$155	$0.11
MO	$190	$0.22
NC	$254	$0.75
SC	$245	$2.00
TN	$194	$1.62

Energy Efficiency Policy Opportunities

Increase efficiency of water use and heating

Energy Efficiency Policy Opportunities

Increase efficiency of water use and heating

Provide incentives for:

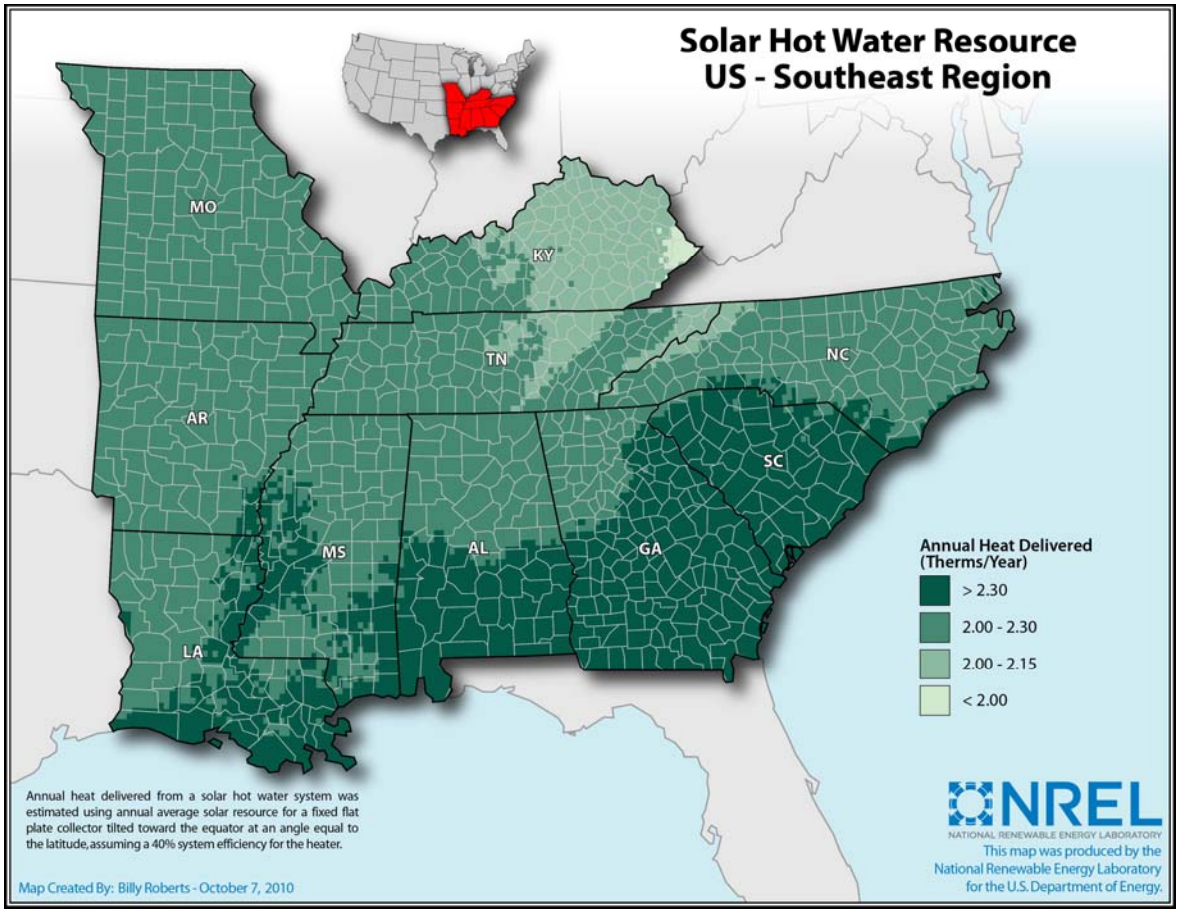
Solar water heaters

WaterSense Appliances

EnergyStar Appliances

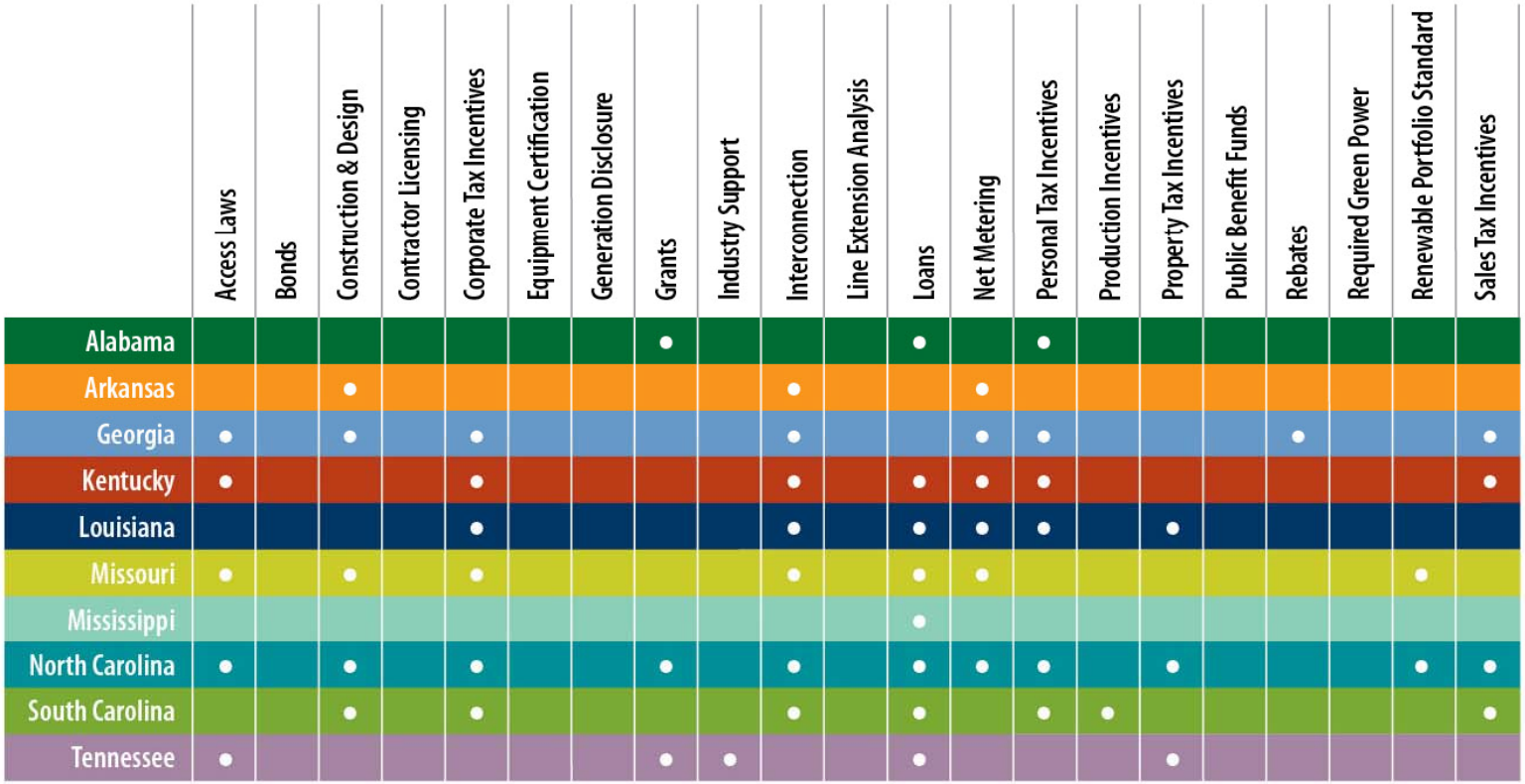
Energy Efficiency Policy Opportunities

Good potential for solar water heating



Current Renewable Energy Policies

State-level Renewable Energy Policies and Incentives



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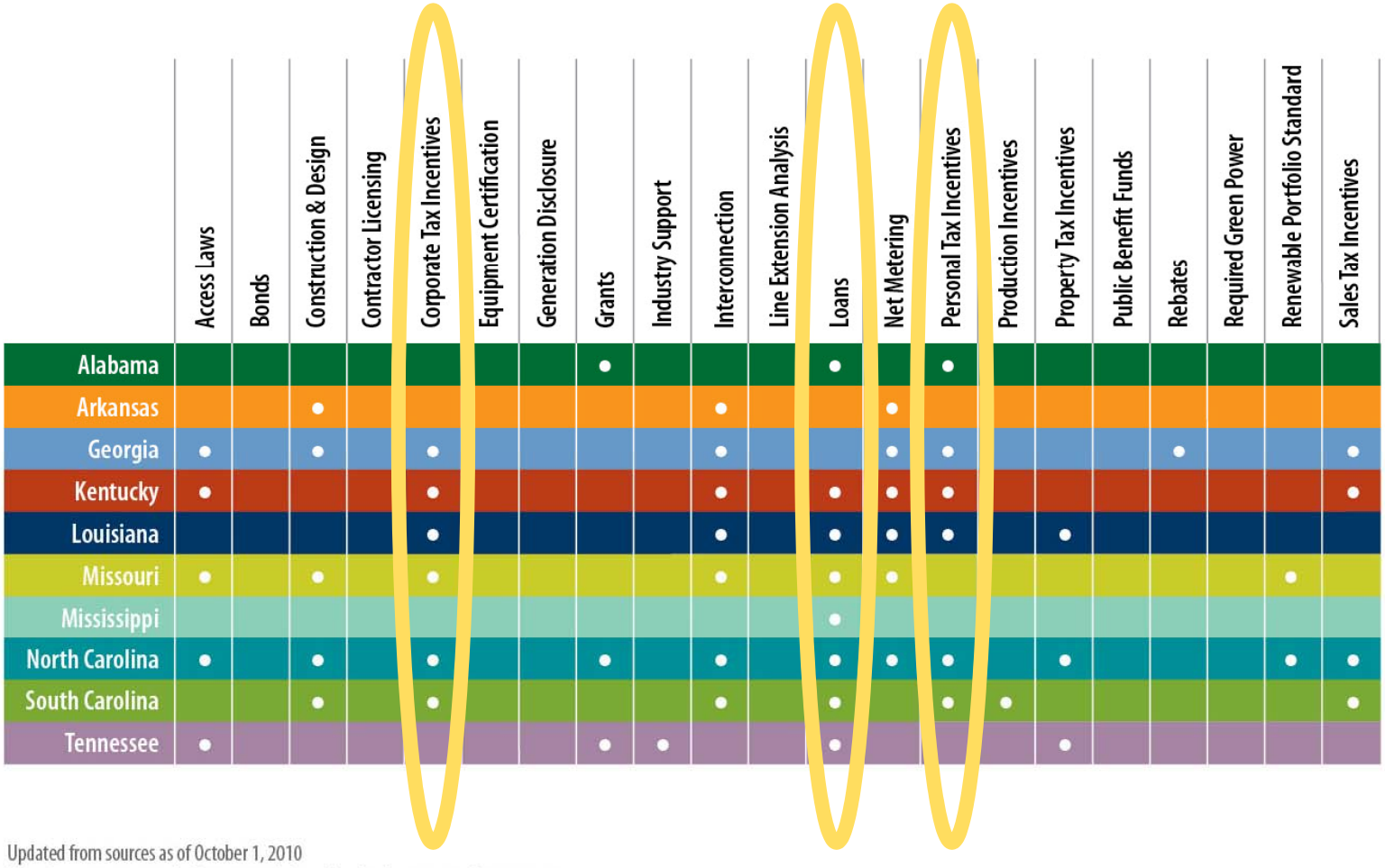
State-level Renewable Energy Policies and Incentives



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Renewable Energy Policy Opportunities

Assist development of a biomass market

Develop incremental and small hydro resources

Remove barriers to third-party power production

Renewable Energy Policy Opportunities

Assist development of a biomass market

Solid Residues -- Methane -- Dedicated Energy Crops

Renewable Energy Policy Opportunities

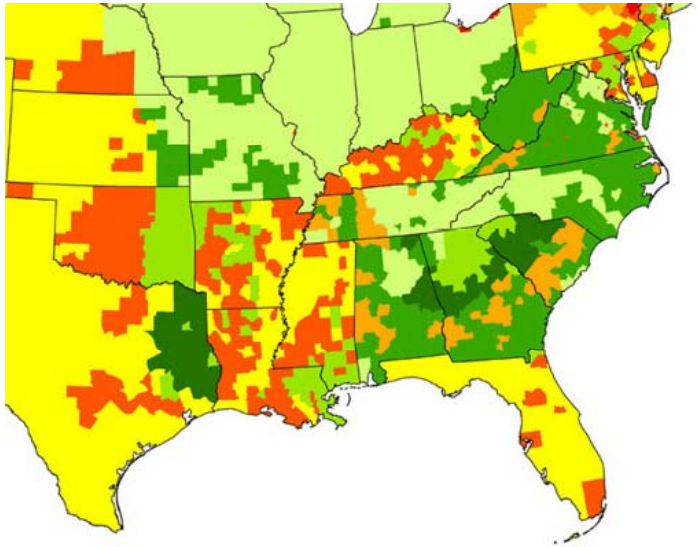
Assist development of a biomass market

Solid Residues -- Methane -- Dedicated Energy Crops

- Include biomass in clean energy policies
- Encourage biomass co-firing in coal plants
- Provide technical support to biomass suppliers and generators
- Encourage growth of dedicated energy crops on Conservation Reserve Program Land

Renewable Energy Policy Opportunities

Southeast has optimum zones for biomass production

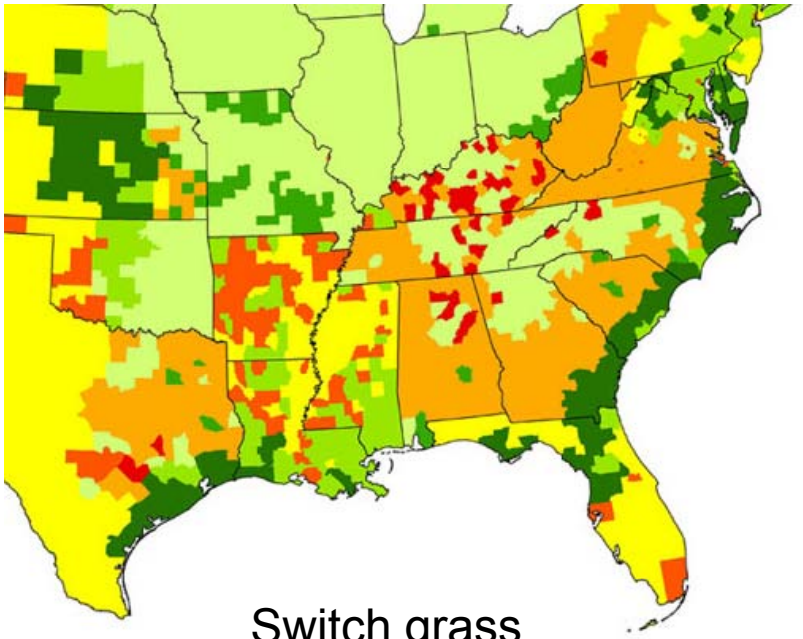


Short-Rotation Woody Crops

Production Classification Zones:

- Low rent, High yield, Low production costs (1) [Most Optimal]
- Low rent, High yield, High production costs (2)
- High rent, High yield, Low production costs (3)
- High rent, High yield, High production costs (4) [Expensive Biomass]
- Low rent, Low yield, Low production costs (5)
- Low rent, Low yield, High production costs (6)
- High rent, Low yield, Low production costs (7)
- High rent, Low yield, High production costs (8) [Least Optimal]

Low Land Rent
High Crop Yield
Low Production Costs



Switch grass

Source: Howell, F., J. Porter, et al. (2010). "Spatial Contours of Potential Biomass Crop Production: An Examination of Variations by U.S. Region." Journal of Rural Social Sciences. Maps reprinted with permission of authors.

Renewable Energy Policy Opportunities

Develop incremental and small hydro resources

Renewable Energy Policy Opportunities

Develop incremental and small hydro resources

- Increase efficiency in existing facilities
- Add incremental capacity in existing facilities
- Continue efforts to identify small hydro opportunities

Renewable Energy Policy Opportunities

Develop incremental and small hydro resources

- Increase efficiency in existing facilities
- Add incremental capacity in existing facilities
- Continue efforts to identify small hydro opportunities

Most of the states in Southeast have the potential to produce 1-2 GW of additional capacity of small and low power hydroelectricity.

Hall, D.; Reeves, K.; Brizzee, J.; Lee, R.; Carroll, G. and Sommers, G. (2006). *Feasibility Assessment of the Water Energy Resources of the United States for New Low Power and Small Hydro Classes of Hydroelectric Plants. Idaho National Laboratory.*

Renewable Energy Policy Opportunities

Remove barriers to third party power production

- Establish interconnection and net metering policies that meet best practice guidelines
- Clarify and standardize permitting processes

Clean Energy Development in the SE

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RE in the SE

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Summary

- Additional capacity will be needed as demand rises and aging plants retire.
- There are plentiful local clean energy resources that can meet part of new capacity needs.
- Policy options exist to encourage clean energy development while improving energy self-reliance, creating local jobs and reducing environmental impacts related to electricity use.

Thank You!

Clean Energy Policy Analyses (CEPA)

www.nrel.gov/cepa

www.nrel.gov/docs/fy11osti/49192.pdf

CEPA is a DOE-EERE Weatherization and Intergovernmental Office funded project designed and implemented at the National Renewable Energy Laboratory

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Renewable Energy Potential

State	Onshore Wind Potential	Offshore Wind Potential	Solar (PV) Potential	Small Hydroelectric Potential	Combined Heat and power (CHP) Potential	Methane-to-Energy Potential	**Total Renewable Energy Potential** (excluding solid biomass potential)	**Solid Biomass Potential** (Forest, Mill, Urban and Farm Residues only)
Alabama	0%	0%	10%	10%	6%	5%	**31%**	895%
Arkansas	49%	0%	13%	27%	7%	7%	**103%**	2343%
Georgia	0%	136%	19%	8%	13%	6%	**183%**	911%
Kentucky	0%	0%	11%	9%	7%	5%	**32%**	608%
Louisiana	1%	1046%	14%	6%	11%	3%	**1080%**	1168%
Mississippi	0%	0%	9%	10%	7%	6%	**31%**	1809%
Missouri	1682%	0%	27%	30%	25%	10%	**1773%**	1271%
North Carolina	2%	728%	19%	12%	14%	12%	**787%**	965%
South Carolina	0%	395%	12%	7%	9%	5%	**429%**	624%
Tennessee	1%	0%	19%	19%	10%	7%	**55%**	510%

Notes:

Potentials are shown as a percent of total state electricity generation as reported in: Energy Information Administration (EIA), Historical State Generation data: 1990–2008 Net Generation by State by Type of Producer by Energy Source (EIA-906), published in the Electric Power Annual 2008 http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html released January 21, 2010.

For detailed notes of how the potentials were calculated, please see the version of this table presented in Chapter 4 of the full report.

Renewable Energy Potential